

Gerr F, Marcus M, et al. A Prospective Study of Computer Users: I. Study Design and Incidence of Musculoskeletal Symptoms and Disorders. Am J Ind Med 2002;41:221-235.

Design: Observational cohort study

Population/sample size/setting:

- 632 newly hired workers starting computer-using jobs with 8 large employers in metropolitan Atlanta
- Eligible for prospective study (1) if they anticipated using a computer at least 15 hours per week or (2) if they anticipated using a computer at least as many hours/week as in their previous job, and (3) did not report musculoskeletal symptoms (MSS) at the time the study began

Main outcome measures:

- The occurrence of two types of musculoskeletal problems were studied: neck or shoulder (N/S) and hand or arm (H/A)
- Participants were asked to complete weekly diaries in which they recorded hours of typing, aerobic activities, non-work hand-intensive activities, and occurrence of MSS; N/S and H/A were recorded separately, but the descriptors for both were pain, aching, burning, numbness, or tingling
- MSS were recorded as incident cases if (1) the intensity was 6 or more on a VAS of 0-10, or (2) if medication was taken for control of the discomfort
- When MSS were reported, the worker was examined by a certified hand therapist, who recorded confirmed disorders if a prespecified set of examination criteria were met; most of the criteria were based on the clinical examination, but carpal tunnel syndrome (CTS) required demonstration of slowing on nerve conduction studies
- Workers with MSS at entry into the study were excluded from the analysis of MSS incidence, but were reported as prevalent cases
- Participants who failed to keep diaries (n=34) were also excluded from the follow-up analysis
- For H/A MSS, 24 of the 632 workers (4%) were symptomatic at baseline and reported as prevalent MSS cases; they were excluded from the study of MSS incidence
- Similarly, 14 of the 24 MSS prevalent cases were confirmed as having H/A disorders, and were recorded as prevalent H/A disorder cases; they were excluded from the study of H/A disorder incidence
- Maximum follow-up period was 38 months, but most of the data was gathered within the first 90 weeks
- For H/A MSS, 141 new cases were reported during follow-up
- For H/A confirmed disorders, 81 new cases were reported during follow-up
- The most common H/A confirmed disorder was deQuervain's tenosynovitis (56 cases); CTS occurred rarely (only 3 cases were confirmed during follow-up), but 26 cases of new median nerve symptoms were examined for CTS

- Multivariable analysis of the data was done with these variables: past history of MSS, ethnicity, age, height, BMI, education, household income, current smoking, duration (years) of computer use, presence of children under 6 in the household, and (for women) whether she was postmenopausal or was taking hormonal medications
- The variables that were significantly associated with onset of H/A MSS were female gender, previous history of H/A symptoms, 2-5 years of previous computer use, > 5 years of computer use (both compared with no previous computer use), and having children under 6 in the household
- The variables associated with H/A confirmed disorders were female gender, 2-5 years of previous computer use, and > 5 years of computer use
- The strongest of the above associations were between previous history of H/A symptoms and new H/A MSS (relative risk of 2.7), and between 2-5 years of previous computer use and new H/A confirmed disorders (relative risk 2.7)
- The authors also reported on occurrence of N/S MSS and confirmed disorders, which occurred more frequently than H/A MSS and disorders; however, it was not clear how many H/A cases also had N/S symptoms as well
- For N/S MSS and disorders, the risk factors in the multivariable analysis were different than for H/A MSS and disorders; for N/S, age, being white, and being in the 20th percentile of height were associated with increased risk of occurrence of N/S problems during follow-up

Authors' conclusions:

- Upper extremity MSS (N/S and H/A combined) affected more than half of the study participants who used a computer more than 15 hr/week at a new job
- The most common H/A disorder was deQuervain's, and other tendon-related disorders occurred frequently as well
- However, CTS was uncommon, affecting only 1% of computer users
- Because the risk factors in the multivariable models for H/A and N/S problems were different, it is likely that they have different pathophysiology
- The study was not designed to determine whether computer use increases the risk of CTS (or other H/A problems); this would require comparison with a population that does not use computers at all

Comments:

- The major limitation appears to be that data on current computer use was gathered with weekly diaries, but the amount of computer use was not even entered into the regression model for risk factors
- Thus, no attempt was made to determine whether high levels of computer use (30-40 hours) was associated with higher risk of H/A or N/S problems than lower levels (15-20 hours)
- It is not clear why the data would have been so carefully gathered if it was not going to be analyzed
- Current computer use (being based on contemporaneous diaries) is likely to be measured more accurately than past computer use, which depends on recall of events that may have occurred years ago

- It seems likely that the onset of a new H/A problem would at least occasionally be accompanied by a new N/S problem, but the frequency of this is not reported
- If the diary was not kept, the worker was “excluded” from the analysis; even though the number was only 34, it is not clear whether this refers to people who never submitted a diary at all, or if it refers to people who kept a diary for a while and then stopped
- If people did keep a diary for a while and then stop (a likely scenario), they should have been allowed to contribute person-time up to the time they stopped their diary entries, which would make them censored observations rather than excluded subjects
- Cox regression was used for the risk factor analyses, but the tables refer to RR (relative risks) rather than the hazard ratios that would be reported if Cox regression was used

Assessment: Inadequate (no attempt made to measure risks associated with current use)